## 7-8 Inverse Functions and Relations

ex:
y = 3x

(1, 3 )

(2, 6 )

Change equation so that you would get (3, 1) and (6, 2).

$y = \frac{1}{3}x$

ex:
y = x + 5

(1, 6)

(2, 7 ) $y = x - 5$

ex:
y = 3x - 1 $y = \frac{x+1}{3}$

(0, −1 ) (−1, 0)

(2, 5 ) (5, 2)

These equations are inverses of one another
(switching of x and y)

Using function notation:
$f(x) = 3x - 1$ $f^{-1}(x) = \frac{x+1}{3}$

$f(0) =$ $-1$

$f^{-1}(-1) =$ $0$

$f(2) =$ $5$

$f^{-1}(5) =$ $2$

If $f(a) = b$, then $f^{-1}(b) = a$.

Given the relation:
{(3, 3) (2, 5) (-2, 5) (-2, 2) (-1, 2) (-1, 3)}

Find the inverse relation.

$\{(3,3)(5,2)(5,-2)(2,-2)(2,-1)(3,-1)\}$

Finding the inverse.
ex:
$f(x) = \frac{-1}{2}x + 1$

1. change to y =
2. switch x and y
3. solve for y
4. change to $f^{-1}(x) =$

$y = -\frac{1}{2}x + 1$
$x = -\frac{1}{2}y + 1$
$x - 1 = -\frac{1}{2}y$
$-2x + 2 = y$

$f^{-1}(x) = -2x + 2$

Find the inverse:

1. $f(x) = \frac{3}{4}x - 6$ $f^{-1}(x) = \frac{4}{3}x + 8$

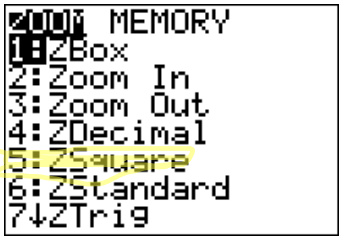
2. $g(x) = \frac{x+2}{3}$ $g^{-1}(x) = 3x - 2$

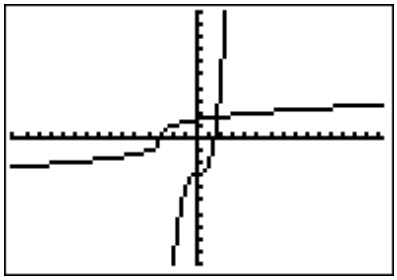
$x = \frac{y+2}{3}$

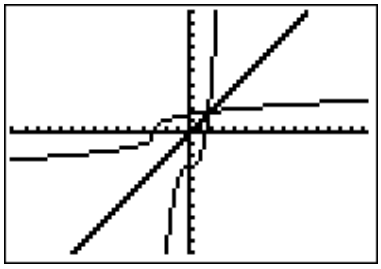
$3y = y + 2$

3. $f(x) = x^3 - 3$ $f^{-1}(x) = \sqrt[3]{x+3}$

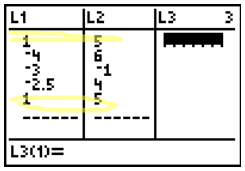
After finding the inverse, graph #3 and the inverse on your calc

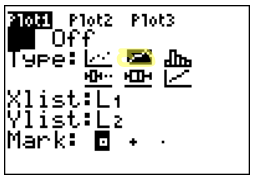


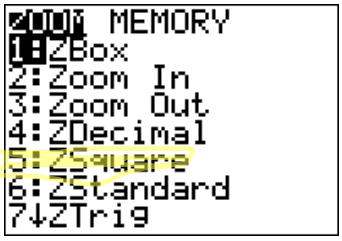



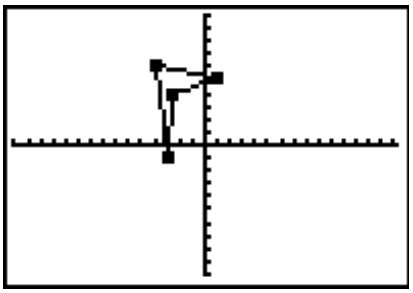


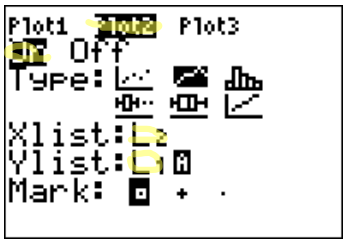
Graph the relation and its inverse:
{(1, 5) (-4, 6) (-3, -1) (-2.5, 4)}

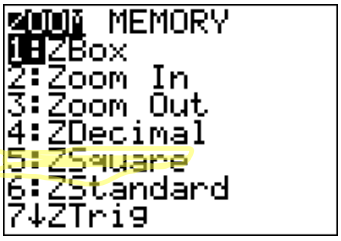


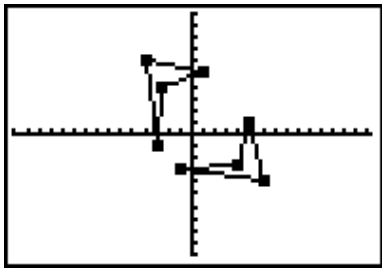



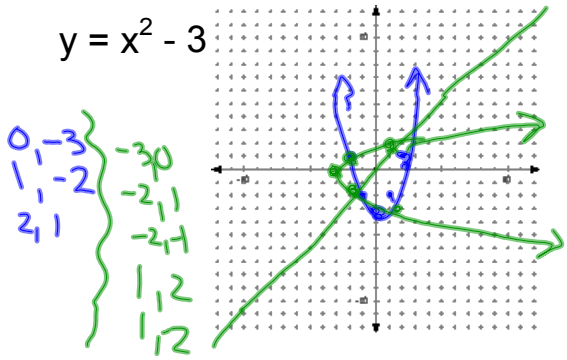




Sketch the inverse.

$y = x^2 - 3$




Show that two functions are inverses of one another

Two functions are inverses of each other iff the composition is the identity function.

$I(x) = x$

$[f \circ g](x) = x$ $[g \circ f](x) = x$

Show $f(x) = \frac{-1}{2}x + 1$ $g(x) = -2x + 2$ are inverses.

$(f \circ g)(x)$ $(g \circ f)(x)$

$= -\frac{1}{2}(-2x+2)+1$

$= x - 1 + 1$

$= x$

HW p393
15-27odd
32, 33